

### **REMARKS**

Claims 1 and 4-6 are pending in the present application. Claim 1 has been amended to incorporate the subject matter of claims 2 and 3. Consequently, claims 2 and 3 have been cancelled. New claims 4-6 have been added, support for which may be found in the specification, at least, at page 4, lines 19-24; page 6, lines 20-24; and page 8, lines 10-14. No new matter has been added by way of the above claim amendments.

#### ***Issues under 35 USC § 102***

Claims 1-3 are rejected under 35 U.S.C. § 102(b) as being anticipated by Takagami et al. (JP 2000-340928) (hereinafter "Takagami").

Applicant respectfully submits that the invention of claim 1, as presently amended, is patentably distinct from the invention disclosed in Takagami, as will be fully explained below. Accordingly, each of the claims which depend on claim 1 (i.e. claims 4-6) are also patentably distinct from Takagami.

#### **Discussion of the Present Invention**

The present invention relates to a production method of a printed circuit board, which provides, at a high-speed, a circuit pattern having a microscopic line width. Further, the present invention permits jet-spraying an ink in accordance with data from a computer and is intended to achieve greater flexibility in circuit designing. (See the present specification, from page 8, line 24 - page 9, line 6).

#### **Distinctions Between the Present Invention and the Cited Prior Art**

The goal of the Takagami method of producing a printed circuit is to easily obtain a printed board in a light room (See paragraph [0007] of Takagami). Thus, the primary concern of Takagami is cost-efficiency. That is, Takagami notes that the light exposure step in

photolithography requires many operations (i.e., increased cost) and therefore to decrease the costs, the exposure step is omitted. Accordingly, instead of photolithography, Takagami employs an inkjet method to form a resist image.

In contrast, in the present invention, the applied ink does not form a resist pattern. The present invention performs a patterning by melting and jet-spraying a solid ink comprising a wax as a main component, on a substrate, in accordance with a data from a computer; subsequently, applying a conductive layer, and removing the solid ink by solving.

Applicant acknowledges that Takagami employs a jet-spraying method to apply the ink. However, this does not mean that Takagami discloses all the specific features of the present invention.

While both the present invention and Takagami employ a jet-spraying method, the present invention differs from the invention of Takagami for at least the following reasons:

- (i) the present invention does not require an etching step;
- (ii) the present invention does not form a resist; and
- (iii) Takagami neither discloses nor suggests the effects of the present invention, i.e., forming a microscopic circuit pattern with a high speed while ensuring flexibility/freedom in designing circuit print.

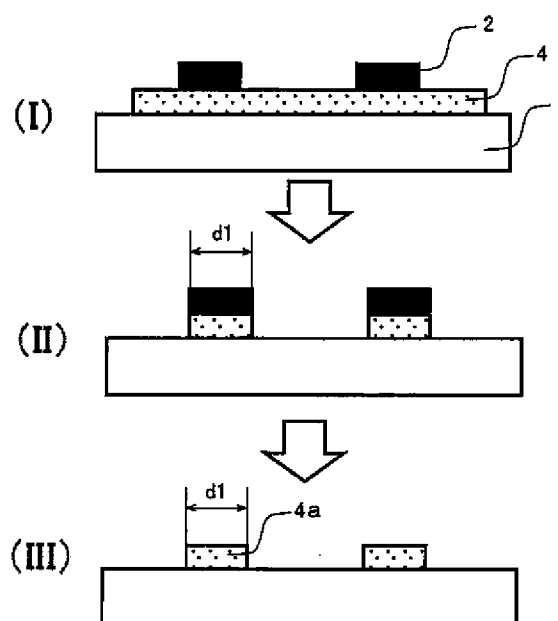
The present invention includes steps of spraying a solid ink to be patterned on a substrate, coating a conductive layer thereon, and removing the solid ink by solving. In the present invention, the solid ink does not form a resist pattern.

However, in the Takagami method, an ink is sprayed on a conductive layer. In the etching step, this ink functions as a resist and protects the conductive layer underneath. As a result of the difference in the timing of spraying an ink, essential differences in functions and effects arise. The present method sprays an ink on a substrate, while Takagami sprays an ink on a conductive layer. The present invention, which sprays an ink on a substrate, can form a fine (microscopic) circuit pattern with a line width smaller than an ink droplet.

In order to facilitate the Examiner's understanding of the distinctions between the present invention and Takagami, Applicants provide the following figures.

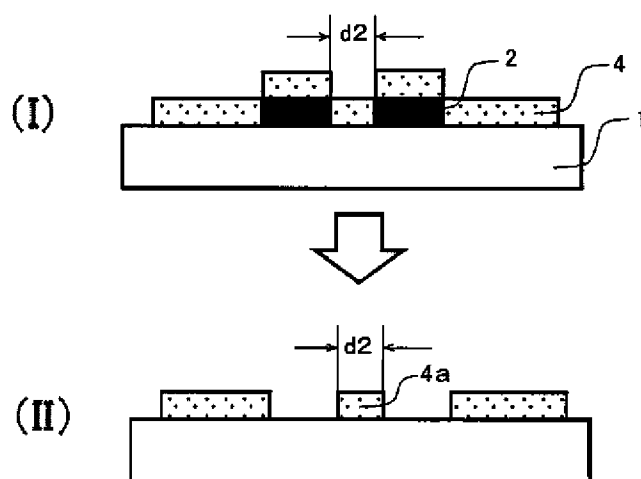
The Takagami method comprises the steps shown in **Fig. A**. First, a conductive layer 4 is provided on a substrate 1, and then an ink 2 is coated thereon (Step I). Second, the conductive layer 4 at the portions not covered by the ink 2 is removed by etching (Step II). Finally, the ink 2 is removed, leaving the conductive layer 4a forming a circuit pattern (Step III). As is apparent from Fig. A, in the Takagami method it is impossible to make the line width of the conductive layer 4a smaller (narrower) than the width of the ink droplet d1.

**Fig. A**



In contrast, the present invention is illustrated in **Fig. B**. In this method, an ink 2 is jet-sprayed to a substrate, and then a conductive layer 4 is coated thereon (Step I). Further, the ink 2 is dissolved and removed together with the conductive layer thereon, leaving the conductive layer 4a to form a circuit pattern (Step II). As is apparent from Fig. B, it is possible to make the line width of the conductive layer forming the circuit pattern smaller than the width of an ink droplet. In other words, with a high accuracy of jet-spraying, the line width of the circuit (corresponds to the distance between the portions jetted with the ink) can be freely made narrower than the ink-droplet width (See the present specification, page 5, lines 11 - 16).

**Fig. B**



The Takagami invention cannot form, at a high-speed, a circuit pattern having a microscopic line width, while maintaining circuit design freedom. Moreover, Takagami does not disclose any method for obtaining microscopic pattern (i.e., any suggestion for creating a line width smaller than the width of ink droplet). By the Takagami method, it is impossible to make the line width of the conductive layer left after the etching process narrower than the width of the line droplet. This drawback is unavoidable as long as this type of process is employed.

Thus, for at least the reasons discussed above, Applicant respectfully submits that Takagami does not render claims 1 and 4-6 obvious. Reconsideration and withdrawal of the outstanding rejection are respectfully requested. Moreover, a Notice of Allowance is earnestly solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Monique T. Cole, Reg. No. 60,154 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.147; particularly, extension of time fees.

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Respectfully submitted,

By  #42.874

Marc S. Weiner

Registration No.: 32,181

BIRCH, STEWART, KOLASCH & BIRCH, LLP

8110 Gatehouse Road

Suite 100 East

P.O. Box 747

Falls Church, Virginia 22040-0747

(703) 205-8000

Attorney for Applicant